Physica Status Solidi (B) Basic Research 2013 vol.250 N10, pages 2137-2140

High-frequency EPR, ESE, and ENDOR spectroscopy of Co- and Mn-doped ZnO quantum dots

Baranov P., Orlinskii S., de Mello Donegá C., Schmidt J.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Co- and Mn-doped ZnO quantum dots (QDs) with ZnO/Zn(OH)2 core-shell structure were studied using high-frequency electron paramagnetic resonance (EPR), electron spin echo, and electron-nuclear double resonance (ENDOR) at low temperature. The shape of the EPR spectrum of cobalt ions was observed to change as a result of Co2+ coupling with optically created shallow donors (SDs). This, along with a shift of SDs line, is a direct demonstration of interaction between the magnetic ion and donor electron in confined system of ZnO QD. ENDOR resonance of the 1H hydrogen nuclei detected by the EPR signal of Co2+ and Mn2+ evidence the hyperfine coupling between these ions, located in the ZnO core, and the protons outside the quantum dot core in the shell. © 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

http://dx.doi.org/10.1002/pssb.201200948

Keywords

Co, Electron nuclear double resonance, Electron paramagnetic resonance, Electron spin echo, Mn, Shallow donor, ZnO